
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Monitor Watershed Conditions On The Warm Springs Reservation

BPA project number: 9802400

Contract renewal date (mm/yyyy): 6/1999 ☒ **Multiple actions?**

Business name of agency, institution or organization requesting funding

The Confederated Tribes of the Warm Springs Reservation of Oregon

Business acronym (if appropriate) CTWSRO

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses

7.6.C, 7.6.D

FWS/NMFS Biological Opinion Number(s) which this project addresses

Other planning document references

A Conceptual Foundation for the Management of Native Salmonids in the Deschutes River, Wy Kan Ush Me Wa Kish Wit, The Integrated Resources Management Plan of the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Deschutes River Subbasin Plan (NPPC 1991), Lower Deschutes River Subbasin Management Plan (ODFW 1997).

Short description

Monitor stream conditions including macroinvertebrate populations and sediment; evaluate fish passage at culverts and stream crossings; and inventory fish habitat in streams on the Warm Springs Reservation.

Target species

spring chinook salmon, summer steelhead, bull trout, Pacific lamprey, rainbow trout, other resident fish species.

Section 2. Sorting and evaluation

Subbasin

Deschutes

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input checked="" type="checkbox"/> Anadromous fish <input type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input type="checkbox"/> Multi-year (milestone-based evaluation) <input checked="" type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input checked="" type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1981	Phase I, (1981 -1982) Compile and analyze physical and biological data on anadromous fish streams,	Yes, CH2M Hill Report
1983	Phase II, (1983-1989) Estimate natural production under current habitat conditions and design enhancement projects.	Yes, established guidelines for estimating production and developed enhancement projects
1984	Phase III (1984-1991) Implement, Monitor and evaluate enhancement measures identified in Phase II.	Some biological objectives met. Inadequate funding and support during study resulted in inconsistencies in monitoring design and short duration of sampling program (Fritsch, 1995). Statistical models could not demonstrate significant treatment effects.
		Some changes observed such as increased spawning distribution and increased vegetative cover in riparian exclosures, etc.
1996	Early Action Watershed Project, 1996. Riparian exclosures and associated water developments.	Projects had to be rebuilt in 1997 due to major flood and fire effects. Monitoring ongoing.
1998	1998 Watershed Restoration Project, implement livestock water developments, implement fish habitat inventories, collect information on fish populations in Shitike Creek.	Yes, water developments completed, monitoring ongoing, habitat inventories complete and presented in report format, no information collection in Shitike Creek due to unfavorable sampling conditions in 1998.

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
	Determine aquatic macroinvertebrate community conditions for selected streams on the Reservation.	a	Select sample sites in the Warm Springs River, Nena, Eagle, Skookum, Beaver, Mill, Badger, Boulder, Mariel and Whitewater creeks.
		b	Collect macroinvertebrate samples as

			described in Section 7-4.
		c	Analyze samples.
		d	Create database and summarize.
2	Conduct culvert/stream crossing inventory in the forested and non-forested portions of the Reservation to assess potential barriers to anadromous and resident fish passage and assess sources of sediment introduction from improperly sized culverts.	a	Coordinate with BIA and CTWSRO to obtain road crossing and culvert information on class I,II and III streams, in both the forested and non-forested portion of the reservation.
		a	Prioritize inventory sites by stream class, fish distribution and seasonal accessibility.
		b	Survey each site using techniques described in Section 7 -4.
		c	Create database and summary.
3	Assess the quality and composition of anadromous and resident fish spawning gravels in stream reaches on the Reservation using McNeil core sampling.	a	Select 35 sites for surveying. Sites will include stream reaches within the forested area and non-forested area of the Warm Springs Reservation.
		b	Contract for sampling survey.
		c	Analyze and summarize data.
4	Continue inventories of anadromous and resident fish habitat in the Warm Springs River and its tributaries.	a	Contract with Aquatic Inventories Project (Kim Jones, Oregon Department of Fish and Wildlife).

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	1/2000	3/2001	Determine aquatic macroinvertebrate community conditions for selected streams on the Reservation.		30.00%
2	1/2000	3/2001	Conduct culvert/stream crossing inventory in the forested and non-forested portions of the Reservation to assess		22.00%

			potential barriers to fish passage. Determine sources of sediment introduction to streams from improperly sized culverts.		
3	1/2000	3/2001	Assess the quality and composition of anadromous and resident fish spawning gravel in stream reaches on the Reservation using McNeil core sampling.		11.00%
4	1/2000	3/2001	Continue inventories of anadromous and resident fish habitat in the Warm Springs River and its tributaries Nena, Eagle and Skookum creeks and Marial and Parker creeks.		37.00%
				Total	100.00%

Schedule constraints

Timing of all objectives contingent on favorable sampling conditions.

Completion date

March, 2001.

Section 5. Budget

FY99 project budget (BPA obligated):

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel		%25	40,350
Fringe benefits	23%	%5	9,281
Supplies, materials, non-expendable property		%4	7,710
Operations & maintenance			
Capital acquisitions or improvements (e.g. land,			

buildings, major equip.)			
NEPA costs		%0	1,500
Construction-related support			
PIT tags	# of tags:		
Travel	2 nights per diem Portland, 2 nights per diem Eugene	%0	466
Indirect costs	41.4% (likely maximum, rates not negotiated yet)	%14	23,932
Subcontractor	Objectives 1,3,4	%48	77,678
Other			
TOTAL BPA FY2000 BUDGET REQUEST			\$160,917

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
CTWSRO	staff time, vehicle costs, some equipment	%9	17,550
Total project cost (including BPA portion)			\$178,467

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	\$200,000	\$200,000	\$200,000	\$250,000

Section 6. References

Watershed?	Reference
<input type="checkbox"/>	Columbia River Inter-tribal Fish Commission. 1995. Wy-Kan-Ush-Mi-Wa-Kish-Wit, The Spirit of the Salmon. Columbia River Inter-tribal Fish Commission, Portland, Oregon.
<input type="checkbox"/>	Confederated Tribes of the Warm Springs Reservation of Oregon. 1997. Integrated Resources Management Plan for the Non-forested and Rural Areas. Draft Report. Warm Springs, Oregon.
<input type="checkbox"/>	Environmental Defense Fund and Confederated Tribes of Warm Springs. 1995. Restoring the Deschutes River. Environmental Defense Fund, New York, New York.
<input type="checkbox"/>	Fritsch, M.A. 1995. Habitat Quality and anadromous fish production on the

	Warm Springs Reservation. Final Report. DOE/BP 32564-1, Bonneville Power Administration, Portland, Oregon.
<input type="checkbox"/>	Lestelle, L.C., L. Mobrand, J. Lichatowich, and T. Vogel, 1996. Ecosystem Diagnosis and Treatment, Applied Ecosystem Analysis. A Primer. DOE/BP-33243-2, Bonneville Power Administration, Portland, Oregon.
<input type="checkbox"/>	Lichatowich, J, 1998. A Conceptual Foundation for the Management of Native Salmonids in the Deschutes River. Portland General Electric Report, Portland, Oregon.
<input type="checkbox"/>	McNeil, W.J. and W.H. Ahnell, 1960. Measurement of gravel composition of salmon streambeds. Fisheries Research Institute Circular 120, Seattle, Washington.
<input type="checkbox"/>	Moore, K., K. Jones, and J. Dambacher, 1995. Aquatic Inventory Project: Methods for Stream Habitat Surveys. Research and Development Section, Oregon Department of Fish and Wildlife, Corvallis, Oregon.
<input type="checkbox"/>	Oregon Department of Fish and Wildlife, 1997. The Lower Deschutes River Subbasin Management Plan. ODFW, Portland, Oregon.
<input type="checkbox"/>	Oregon Department of Fish and Wildlife and the Confederated Tribes of the Warm Springs Reservation of Oregon, 1989. Deschutes River Subbasin Plan. Northwest Power Planning Council, Portland, Oregon.
<input type="checkbox"/>	Oregon Department of Fish and Wildlife and the Confederated Tribes of the Warm Springs Reservation of Oregon, 1989. Deschutes River Subbasin Plan. Northwest Power Planning Council, Portland, Oregon.
<input type="checkbox"/>	Sehgal, D.R. and G. Heckman, 1982. The Confederated Tribes of Warm Springs streamside Management Plan. Natural Resources Department Document. Warm Springs, Oregon.

PART II - NARRATIVE

Section 7. Abstract

The CTWSRO is proposing to implement BPA funded watershed monitoring and evaluation activities on the reservation in conjunction with enhancement activities funded by CTWSRO and other entities.

Objectives include collecting information on aquatic macroinvertebrate community conditions for specific streams, conducting a culvert/stream crossing inventory in the forested and non-forested portions of the Reservation to assess potential barriers to anadromous and resident fish passage and assess sources of sediment introduction from improperly sized culverts. In addition, the CTWSRO proposed to assess the quality and composition of anadromous and resident fish spawning gravel in stream reaches on the Reservation using McNeil core sampling and to continue inventories of anadromous and resident fish habitat in the Warm Springs River and its tributaries. BPA would fund

approximately 90 percent of the project and the remaining 10 percent would be contributed by the CTWSRO.

Collected data will be used to develop restoration programs to benefit native populations of spring and summer/fall chinook salmon, summer steelhead, Pacific lamprey, rainbow trout, bull trout and other resident fish species in the Warm Springs River, Shitike Creek and other Deschutes River watersheds. The Warm Springs River and Shitike Creek support the only naturally spawning population of spring chinook salmon in the Deschutes River and one of the last truly wild populations in the region. No hatchery produced fish are allowed to intentionally spawn above the weir at river mile 9 on the Warm Springs River. The project area contains bull trout which are listed as threatened under the Endangered Species Act. Summer steelhead in the project area are proposed to be listed as "threatened". A determination will be made in 1999.

Data collected will be incorporated in to tribal watershed assessment efforts such as the Ecosystem Diagnosis and Treatment process and the Cumulative Impact Analysis.

Section 8. Project description

a. Technical and/or scientific background

The Deschutes Basin is the second largest watershed in the state of Oregon. Water quality varies in the Deschutes from pristine to degraded, with some areas experiencing high water temperatures. The most recent and definitive water quality study in the Deschutes Basin was a collaborative effort between the Confederated Tribes of Warm Springs (CTWSRO) and the Environmental Defense Fund (EDF). The study indicates that there are environmental problems in the basin that affect natural resources, the quality of life and the economic future of the basin (EDF 1995). Present environmental conditions reflect that irrigation, grazing, forestry, hydropower generation, urban development and recreation have impacted natural resources throughout the basin. Objectives included in this proposal aim to assess the degree of impact in Reservation streams.

The only remaining naturally spawning populations of spring chinook salmon in the Deschutes River are in the Warm Springs River and Shitike Creek, both located on the Warm Springs Reservation. Protection and restoration of habitat in these areas is critical to maintaining these native populations. In addition, native populations of summer/fall chinook salmon, summer steelhead, bull trout, Pacific lamprey, mountain whitefish, sculpin, chiselmouth, dace, rainbow trout and other resident fish are located in the Warm Springs River and its tributaries. Summer steelhead and rainbow trout are located in Nena, Eagle and Skookum creeks, which are identified for fish habitat inventories. Bull trout are located in Marial and Parker creek which are also identified for habitat inventories. The CTWSRO is interested in protecting habitat for native fish populations as they all play a role in the ecosystem and in tribal culture.

To provide the Deschutes basin with a watershed management framework, the CTWSRO are implementing the Ecosystem Diagnosis and Treatment (EDT) process for the Deschutes basin. EDT is an applied ecosystem analytical tool that integrates existing information on environmental conditions with natural life cycles (anadromous and resident fish) by stream reach and life stages methodology (Lastelle 1996). The EDT method is a science-based approach to analyzing data and actions to maintain or improve the production of fish resources. Results of EDT will provide CTWSRO with indications of where fish life histories have been compromised due to environmental conditions. This will indicate where and what restoration treatments are most likely to succeed. Initial results are expected in 1999. In addition, A Conceptual Foundation for the Management of Native Salmonids in the Deschutes River (Lichatowich 1998) has recently been released in its final draft and it, together with the results of the EDT process, will provide the Deschutes basin with a strong biological foundation for resource management decisions.

Anadromous fish populations on the Reservation are generally declining. Causes include out-of-basin habitat conditions as well as habitat conditions on the reservation. Timber harvest, road building and uncontrolled livestock grazing have lead to degraded stream conditions in some areas. The result is increased sediment input, increased temperatures, and passage barriers in some stream reaches. Inventories for macroinvertebrates, sediment, culvert status and fish habitat quality will describe the current conditions and be used to prioritize areas for restoration.

A Cumulative Impact Analysis (CIA) Methodology has been developed for the Reservation in order to match the timing of management activities with those of the natural system. It is used on the Reservation to monitor threshold values indicating a watersheds capacity to withstand management activities without incurring significant damage from a major storm event. CIA threshold values have been determined for most watersheds on the Reservation.

The cumulative runoff acreage (CRA) is a value that measures the percentage of compacted soil, bare ground and other impacts of management. Higher values indicate greater impacts have occurred in the watershed. Most watersheds have a CRA threshold of 25 percent, but those containing highly erosive soils may have a threshold of 20 percent or less. In watersheds where the current CRA value exceeds the designated threshold value from CIA analysis, actions have been taken to mitigate degraded areas. This has included road and skid trail eradication, and erosion-control seeding and projects deemed necessary to bring CRA values below threshold values within a reasonable time frame.

Data collected from the proposed actions in this document, combined with the analyses described above, will provide information to develop an assessment of current watershed conditions and the ability of the watershed to function correctly and sustain management activities. The EDT process will continue to be refined as additional data is gathered and CRA values for watersheds on the Reservation will be recalculated in the next few years.

b. Rationale and significance to Regional Programs

This project is consistent with all known tribal and federal laws. This project is consistent with several areas of the NPPC's Fish and Wildlife Program (Program), and the sponsors submit it as a watershed project that will benefit both anadromous and resident fish. Specifically it is consistent with Section 6 of the Program that calls for watershed based habitat restoration focusing on protection of wild and natural populations. The proposed project is an out-of-kind mitigation.

Section 7.6D of the Program identifies habitat objectives for sediment, water quality, large woody debris, bank stability, riparian vegetation and other habitat parameters and impacts to fish habitat. Actions proposed in this document are designed to assess fish habitat in reservation streams to determine if Program objectives are being met. Future proposals will focus on improving fish habitat conditions that do not meet the Program objectives.

In addition, in 1998 and 1999, the Independent Scientific Review Panel recommended that watershed restoration be preceded by a watershed assessment. For FY 2000 the CTWSRO proposes actions designed to make progress towards completion of watershed assessments for watersheds on the Warm Springs Reservation.

The project area contains bull trout which are listed as threatened under the ESA. Critical habitat has not yet been designated. Summer steelhead in the project area are proposed to be listed as "threatened". A determination will be made in 1999.

A Conceptual Foundation for the Management of Native Salmonids in the Deschutes Salmonids in the Deschutes River (Lichatowich 1998) has recently been released in its final draft and recommends that fishery managers examine the relationship between life history diversity of fish in the basin and habitat attributes. The inventories described in this proposal will provide data on habitat attributes and the EDT process, begun by CTWSRO in 1998, will provide an analysis of the life histories of spring chinook salmon and summer steelhead as they relate to these habitat attributes.

c. Relationships to other projects

Other funds are continuing to be sought for restoration actions that are designed to correct land management actions that have lead to habitat degradation or actions that address obvious, chronic problems. The CTWSRO continues to work with the Deschutes Resources Conservancy, Oregon Trout, Trout Unlimited, the Environmental Protection Agency, the Northwest Area Foundation, the State of Oregon, Natural Resources Conservation Service, watershed councils, private landowners and many others to improve watershed health in the lower Deschutes River.

In 1986, the Warm Springs Tribal Council adopted Resolution 7410 (Ordinance 74) that called for an integrated planning approach to natural resource management. An Integrated

Resource Management Plan (IRMP) for the forested area of the reservation was implemented in 1992 and the IRMP for the non-forested and rural areas is currently under public review. The IRMP provides management direction for natural resources on the reservation and establishes resource goals, objectives and desired future conditions. It also established standards and best management practices for management. The IRMP process incorporates a “mid course correction” which works under the adaptive management principle. If monitoring and evaluation indicate that management change is necessary, the mid course review allows for changes to be incorporated into the plan, mid-way through its implementation.

Since 1992 the CTWSRO has collaborated with the EDF to promote sustainable development and the protection of ecosystems in the Deschutes River Basin, with an emphasis on water and fisheries resources. In 1995, the CTWSRO and EDF prepared “Restoring the Deschutes River” which presents research and analysis to document environmental conditions and trends in the Basin, focusing on instream flows and water quality. The CTWSRO continues to promote watershed protection and restoration in the basin.

d. Project history (for ongoing projects)

BPA funded work began in 1981 and continued through 1990 (project #81-108). Work included riparian fencing and instream work (log weirs, boulder placement, juniper revetment). This project was implemented in three phases (see section 4 above) and encompassed 26 km of key anadromous habitat on the Reservation. Inadequate funding and support during the study resulted in inconsistencies in monitoring design and short duration of sampling program (Fritsch 1995). Statistical models could not demonstrate significant treatment effects. Some improvements were observed such as increased spawning distribution for spring chinook salmon and increased vegetative cover in riparian exclosures, etc.

Tribally funded restoration work began in the mid-1980's and included fencing, road eradication, seeding and planting, and streambank stabilization.

Additional BPA funded habitat restoration began in 1996 with the funding of the Early Action watershed projects. Efforts resulted in 11 miles of riparian fencing along the Deschutes River and 7.4 miles of the Warm Springs River. Seven solar pumps with troughs have been installed along the Deschutes and Warm Springs rivers in association with the riparian fences. Monitoring of these restoration efforts is ongoing. Cost shared projects with the BPA in 1998 and 1999 are designed to lessen grazing impacts by providing off channel water developments for livestock, excluding livestock from a native grass demonstration project and rehabilitating native surface roads. Monitoring of these projects is being initiated and will be ongoing.

Other current restoration efforts on the Warm Springs Reservation include a three phase restoration program in the Seekseequa Creek watershed funded by the NRCS through the

Environmental Quality Incentive Program to bring the watershed within CRA values. This project is funding road eradication and fencing and seeding with native grasses. The Deschutes Resources Conservancy, the Governors Watershed Enhancement Board, EPA, Bring Back the Natives, Oregon Trout, Bureau of Indian Affairs and others continue to contribute funds for riparian fencing, solar water developments and instream enhancement work that will benefit anadromous and resident fish by improving water quality and fish habitat.

e. Proposal objectives

Objective 1. Determine aquatic macroinvertebrate community conditions for selected streams on the Reservation.

Results/deliverables: This objective will characterize the aquatic macroinvertebrate communities for monitoring activities associated with land management and restoration activities that will be implemented. The surveys will also be used in an ecological database for “least impacted” streams on the reservation so that these areas can be targeted for protection (protect the best). This information will be combined with other data for watershed analyses.

Objective 2. Conduct culvert/stream crossing inventory in the forested and non-forested portions of the Reservation to assess potential barriers to anadromous and resident fish passage. Determine potential sources of sediment introduction to streams from improperly sized and installed culverts. Results/deliverables: Data for prioritizing removal, replacement and repairs of culverts to minimize adverse impacts to fish. Would allow for better assessment of potential effects of 50 and 100 year flood events.

Objective 3. Assess the quality and composition of anadromous and resident fish spawning gravel in stream reaches on the Reservation using McNeil core sampling.

Results/deliverables: Data will be collected to evaluate the composition and characteristics of spawning gravel. The percentage of fine sediments in various size classes will be estimated and spawning gravel composition among stream reaches and watersheds will be compared. A baseline from which trends in gravel composition can be assessed over time will be established.

Objective 4. Continue inventories of anadromous and resident fish habitat in the Warm Springs River and its tributaries. Deliverable/results: A contract will be established with ODFW (Aquatic Inventories Project) to inventory 46 miles of Nena, Eagle and Skookum Creeks, Mariel and Parker creeks and the lower Warm Springs River. Data collected will be used to determine where fish habitat conditions are degraded. Restoration and protection activities will be developed based on the results of these inventories. These inventories are a high priority due to the potential ESA listings for summer steelhead, and Deschutes fall chinook salmon, and the listing of bull trout. A final report detailing the results will be provided to CTWSRO by ODFW that will present the information collected in summary and graphic form as well as specific reach data.

f. Methods

Objective 1. Macroinvertebrate Inventory

Sampling will occur during late spring through early fall (May-October). Sampling will occur in riffle and pool habitats and at large woody debris accumulations. Sites will be selected and sampling will be performed by CTWSRO staff. Two sites within each habitat unit will be randomly selected for sampling. Samples will be collected by placing a 500 micron sampling net over the substrate with the net drifted downstream. Surface material will be scrubbed to detach macroinvertebrates and allowed to flow into the net with the flow of the stream. Underlying substrate will be stirred to a depth of 4 inches to release additional invertebrates. The net will then removed from the stream and the concentrated sample will be transferred to a sampling jar. The samples will be preserved in an 80% ethyl alcohol solution and shipped to a contracted laboratory for analysis.

Objective 2. Road Crossing and Culvert Inventory

Surveys will occur during the summer months when road conditions are suitable. Coordination with Bureau of Indian Affairs (BIA) roads department to obtain culvert locations, sizes and lengths will occur before the survey begins. Measurements of culvert slope, stream slope and fill slope will occur using a stadia rod and survey level. Survey techniques used are described in Harrelson et. al. 1993. Additional information to be collected includes amount of road fill, culvert length and width, structure type, rustline height, road surface material, presence of a jump/resting pool, height of jump, stream class, distance to fish bearing stream, drainage area upstream of culvert, and dominant stream habitat type upstream. Photographs will be taken of each culvert/crossing and sketches of the site will be drawn. Upon collection of data, a culvert database will be created and a Geographical Information System (GIS) layer map will be created based upon GPS locations and data.

3. McNeil Gravel Sampling

A total of 35 sites will be surveyed. Sampling protocol is described by McNeil and Ahnell (1960). Three samples will be collected and analyzed from each site. Each site will be measured into square meter sections. Sections will be sampled randomly within each site. Beginning with the downstream sections, a McNeil core sampler will be inserted into the substrate to a depth of 15 centimeters. Substrate will then be transferred to a five gallon bucket and sieved into various size classes. From each site, samples will be analyzed by mean cumulative percent particle composition and percent of fine sediment.

Objective 4. Continue inventories of anadromous and resident fish habitat in the Warm Springs River and its tributaries. Habitat inventories (ODFW , modified Hankin and Reeves methodology) began on the reservation in 1996 with 30 miles of the mainstem Warm Springs River inventoried. Fifty-five miles of inventories in Beaver Creek, a tributary to the Warm Springs River were proposed in a watershed project proposal for

1998. For 1999 we propose to complete all remaining major streams. These include Badger Creek and Mill Creek, both tributaries to the Warm Springs River.

Stream surveys will be conducted using methods described in Moore et al. (1995). The collection and analysis of the stream survey information is based on a hierarchical system of basins, streams, reaches and habitat units. The survey teams collect field data based on stream, reach and habitat units. Crews estimate the length and width of each habitat unit. At every unit, attributes are estimated or measured to describe gradient, substrate, woody debris, shade, features of instream cover and bank stability. Crews will survey streams by walking the stream from mouth to headwaters.

Habitat features are summarized by stream, watershed and basin. The data will be compiled into a comprehensive database that describes key attributes of instream habitat, riparian structure and channel morphology. The survey data will be dynamically segmented in a GIS onto a 1:100,000 scale digitized stream layer to display habitat features and combinations of habitat features relative to location of streams, reaches and habitat units in the watershed. The information will be used to describe current status of habitat throughout the basin and the potential to support fish populations. The data sets will be used for developing restoration strategies that target watersheds, streams and stream reaches.

g. Facilities and equipment

Objective 1. Macroinvertebrate Inventory

Equipment needed includes: sample bottles and labels, surber sampler or kick net, ethanol, field notebooks.

Objective 2. Road Crossing and Culvert Inventory

Equipment needed includes: Global Positioning System Unit, survey level and tripod, 100' measuring tape, data caddy, field notebooks, spring clamps and film.

Objective 3. McNeil Gravel Sampling

Equipment needed includes: McNeil core sampler, standard sieves, graduated cylinders, buckets, hip boots.

Objective 4. No equipment needed.

h. Budget

Objective 1. Macroinvertebrate Inventory

Includes three month biologist salary (\$2625/mo) and six months of technician salary (\$2052/mo) plus fringe benefits. Equipment includes a surber (\$200), sample bottles

(\$210), formalin (\$200), kicknet (\$100), shipping costs (\$200) and miscellaneous supplies (\$50). Lab analysis (subcontract) is estimated at \$13,778.

Objective 2. Road Crossing and Culvert Inventory

Includes three month biologist salary (\$2625/mo) and six months of technician salary (\$2052/mo) plus fringe benefits. Equipment includes a Global Positioning System Unit for accurate position fixes (\$4000) (note this unit will be used for objectives 1 and 3 also), a survey level and tripod estimate slope (\$850), 100' measuring tape, data caddy, field notebooks, spring clamps and film (200).

Objective 3. McNeil Gravel Sampling

No funds for salary will be requested. Equipment needed include a McNeil Core sampler (\$300), various size sieves (\$800), graduated cylinders (\$100), hip boots (\$100) and buckets (\$50). Lab analysis is estimated at \$13,300.

Objective 4. No funds for salary will be requested. No equipment needed. Inventories will be subcontracted for 46 miles at a rate of \$1100/miles (\$50,600).

Section 9. Key personnel

Project contacts:

Patty O'Toole

Duties include project administration, planning, design, implementation, coordination and monitoring and evaluation of watershed restoration projects.

B.S. Zoology, Oregon State University, area of emphasis: Organismal Biology, 1989
Employed by the Confederated Tribes of the Warm Springs Reservation of Oregon.

Eight years in fisheries management, project planning and implementation (production, management and habitat). Lead preparer for the Hood River Production Project Master Plan, Master Agreement and Environmental Impact Statement. Contributor to IRMP I and II.

Richard Pyzik

Duties include planning of timber sales, protection and restoration of fish and wildlife habitat, preparation of environmental assessments and biological evaluations.

B.S. Biology, Pacific University, area of emphasis: Natural Resources, 1989

Employed by the Confederated Tribes of the Warm Springs Reservation of Oregon.

Nine years in fisheries and habitat management, monitoring and evaluation. Experience with habitat restoration, fish passage, juvenile and adult fish sampling, lake and stream surveys, and water quality.

Other qualified project personnel will be assigned/hired/contracted when contract is established with BPA.

Section 10. Information/technology transfer

Information collected will be made available via Streamnet and informational reports will be available detailing project specifics. Site visits with government and private groups will be held and information may be presented at watershed, and fisheries workshops.

Congratulations!